

WHAT IS CLAIMED IS:

1. A non-contact extrusion nozzle head for applying sealant material to a U-shaped receiving channel defined by two panes of glass and a spacer frame for forming an insulated glass assembly,

5 comprising:

a) a nozzle head housing having a nozzle inlet channel extending into said nozzle head housing;

b) said nozzle head housing having a nozzle extension member mounted thereon;

10 c) said nozzle extension member having a nozzle outlet channel formed therein being connected to said nozzle inlet channel for receiving sealant material from said nozzle inlet channel;

d) an interior chamber formed in said nozzle extension member and having a nozzle outlet opening, said interior chamber being connected to said nozzle outlet channel for receiving sealant material therefrom; and

e) said nozzle outlet opening for supplying sealant material to fill the space defined by the U-shaped receiving channel between the two panes of glass and the spacer frame.

20 2. A non-contact extrusion nozzle head in accordance with Claim 1, wherein said nozzle head housing includes a first section connected to a second section.

3. A non-contact extrusion nozzle head in accordance with Claim 2, wherein said first section is cylindrical in shape.

4. A non-contact extrusion nozzle head in accordance with  
Claim 2, wherein said second section is cylindrical in shape.

5. A non-contact extrusion nozzle head in accordance with  
Claim 4, wherein said second section has a smaller diameter than  
5 said first section.

6. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle head housing further includes means  
for mounting said nozzle head housing on a holding plate.

7. A non-contact extrusion nozzle head in accordance with  
10 Claim 6, wherein means for mounting includes a mounting opening for  
receiving a machine bolt or machine screw therein.

8. A non-contact extrusion nozzle head in accordance with  
Claim 6, wherein said nozzle head housing further includes a pair  
of locating pins being 180° degrees opposed from each other for  
15 being received within locating pin openings of said holding plate.

9. A non-contact extrusion nozzle head in accordance with  
Claim 8, wherein said pair of locating pins align said nozzle head  
housing in a pre-determined position such that said nozzle outlet  
opening extends inwardly into said U-shaped receiving channel for  
20 extruding the sealant material therein.

10. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle inlet channel is cylindrical in shape.

11. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle outlet channel is cylindrical in  
shape.

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12. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle outlet opening is substantially  
rectangular in shape.

13. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle outlet channel is perpendicular to  
said nozzle inlet channel.

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14. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle outlet channel is in line with said  
nozzle inlet channel.

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15. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said interior chamber is perpendicular to said  
nozzle outlet channel.

16. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle outlet channel is connected to an  
intermediate section of said interior chamber thereby forming a  
recess at one end of said interior chamber remote from said opening  
5 at the other end of said interior chamber, said recess for  
receiving and storing the sealant material before it is extruded  
from said nozzle head.

17. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle extension member includes front and  
10 rear tapered walls.

18. A non-contact extrusion nozzle head in accordance with  
Claim 1, wherein said nozzle head housing is made from durable  
plastic compositions, metals or metal alloys.

19. A non-contact extrusion nozzle head in accordance with  
15 Claim 18, wherein said durable plastic compositions are selected  
from the group consisting of nylon, nylatron G, nylon 6/6 with PTFE  
and silicone, polyethylene, polypropylene, polystyrene,  
polyurethane, polyamides, Teflon, Hydex, acetal, acetal with  
polytetrafluoroethylene (PTFE) and silicone; polyester elastomer  
20 with PTFE and silicone; polyvinyl butyryl modified phenolic resin  
matrix composites with the use of E-glass and/or Kevlar-49™  
reinforcing fabric materials contained therein; and equivalents  
thereof.

20. A non-contact extrusion nozzle head in accordance with  
Claim 18, wherein said durable metal or metal alloys are selected  
from the group consisting of brass, stainless steels, steel,  
aluminum, nickel, titanium, tungsten and equivalents thereof.

5        21. A non-contact extrusion nozzle head for applying sealant  
material to a U-shaped receiving channel defined by two panes of  
glass and a spacer frame for forming an insulated glass assembly,  
comprising:

10        a) a nozzle head housing having a first section and a  
second section, a nozzle inlet channel extending into the first and  
second sections of said nozzle head housing;

15        b) said nozzle head housing having a nozzle extension  
member mounted on the exterior of said second section;

20        c) said nozzle extension member having a nozzle outlet  
channel formed therein being connected to said nozzle inlet channel  
for receiving sealant material from said nozzle inlet channel;

25        d) an interior chamber formed in said nozzle extension  
member and having a nozzle outlet opening, said interior chamber  
being connected to said nozzle outlet channel for receiving sealant  
material therefrom; and

30        e) said nozzle outlet opening for supplying sealant  
material to fill the space defined by the U-shaped receiving  
channel between the two panes of glass and the spacer frame.

22. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said first section is cylindrical in shape.

23. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said second section is cylindrical in shape.

5 24. A non-contact extrusion nozzle head in accordance with  
Claim 23, wherein said second section has a smaller diameter than  
said first section.

10 25. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle head housing further includes means  
for mounting said nozzle head housing on a holding plate.

26. A non-contact extrusion nozzle head in accordance with  
Claim 25, wherein means for mounting includes a mounting opening  
for receiving a machine bolt or machine screw therein.

15 27. A non-contact extrusion nozzle head in accordance with  
Claim 25, wherein said nozzle head housing further includes a pair  
of locating pins being 180° degrees opposed from each other for  
being received within locating pin openings of said holding plate.

28. A non-contact extrusion nozzle head in accordance with  
Claim 27, wherein said pair of locating pins align said nozzle head  
housing in a pre-determined position such that said nozzle outlet  
opening extends inwardly into said U-shaped receiving channel for  
5 extruding the sealant material therein.

29. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle inlet channel is cylindrical in  
shape.

30. A non-contact extrusion nozzle head in accordance with  
10 Claim 21, wherein said nozzle outlet channel is cylindrical in  
shape.

31. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle outlet opening is substantially  
rectangular in shape.

15 32. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle outlet channel is perpendicular to  
said nozzle inlet channel.

20 33. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said interior chamber is perpendicular to said  
nozzle outlet channel.

34. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle outlet channel is connected to an  
intermediate section of said interior chamber thereby forming a  
recess at one end of said interior chamber remote from said opening  
5 at the other end of said interior chamber, said recess for  
receiving and storing the sealant material before it is extruded  
from said nozzle head.

35. A non-contact extrusion nozzle head in accordance with  
Claim 21, wherein said nozzle head housing is made from durable  
10 plastic compositions, metals or metal alloys.

36. A method of employing an extrusion nozzle head for  
extruding sealant material within a U-shaped receiving channel of  
an insulated glass assembly, said U-shaped receiving channel being  
defined by two panes of glass and a spacer frame, comprising the  
15 steps of:

- a) aligning the extrusion nozzle head within the U-shaped receiving channel to be spaced from the two panes of glass and the spacer frame in a non-contact manner;
- b) extruding the sealant material from the extrusion  
20 nozzle head by pressure-applying means;
- c) controlling the pressure of said pressure-applying means for filling the U-shaped receiving channel with the extruded sealant material along the perimeter of the insulated glass assembly; and

d) moving said extrusion nozzle head along all sides of the insulated glass assembly.

37. A method in accordance with Claim 36, wherein the step of controlling the pressure of the sealant material further includes  
5 the step of applying the sealant material to provide a smooth finished surface of sealant material within the U-shaped receiving channel.

38. A method of employing first and second extrusion nozzle heads for applying sealant material within a U-shaped receiving  
10 channel of the first, second, third and fourth sides of an insulated glass assembly, said U-shaped receiving channel being defined by two panes of glass and a spacer frame, comprising the steps of:

15 a) moving said first extrusion nozzle head along the first side of said insulated glass assembly to apply said sealant material thereto;

20 b) simultaneously moving said first and second extrusion nozzle heads along the second and fourth sides of said insulated glass assembly to simultaneously apply said sealant material thereto; said second and fourth sides being opposite to each other; and

c) moving said first extrusion nozzle head along the third side of said insulated glass assembly to apply said sealant material thereto.